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U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK

ATTORNEY'S DOCKET NUMBER

**TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371**

CM2069

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)

09/936404

INTERNATIONAL APPLICATION NO.

PCT/US00/06984

INTERNATIONAL FILING DATE

17 March 2000

PRIORITY DATE CLAIMED

19 March 1999

TITLE OF INVENTION

An Article Comprising A Cell System

APPLICANT(S) FOR DO/EO/US

BECHMANN, Georg Rudolf Theobakd et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This express request to begin national examination procedures (35 U.S.C. 371(f) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(l).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application was filed (35 U.S.C. 371(c)(2))
  - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ has been transmitted by the International Bureau.
  - c. ☒ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has **NOT** expired.
  - d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
 

☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☒ A change of power of attorney and/or address letter.
16. ☐ Other items or information:

"Express Mail" mailing label number

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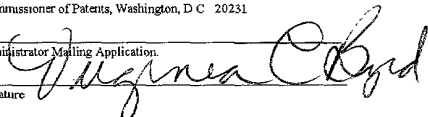
Date of Deposit

11 Sep 2001

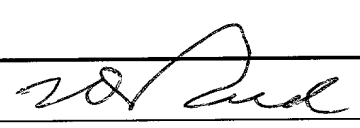
I hereby certify that this paper/fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to The Assistant Commissioner of Patents, Washington, D.C. 20231

Administrator Mailing Application

Signature



T0160"4049E660

U.S. APPLICATION NO. (if known, see 37 CFR 1.5) <b>09/936404</b>		INTERNATIONAL APPLICATION NO. PCT/US00/06984		ATTORNEY'S DOCKET NUMBER CM2069	
				CALCULATIONS PTO USE ONLY	
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$710	
Surcharge of \$130.00 for furnishing the oath or declaration later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$0	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total Claims	17-20 =	0	x \$18.00	\$0	
Independent Claims	1-3 =	0	x \$80.00	\$0	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			\$270.00	\$0	
TOTAL OF ABOVE CALCULATIONS =				\$710	
Processing fee of \$130.00 for furnishing the English translation later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$0	
TOTAL NATIONAL FEE =				\$710	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28,3.31). \$40.00 per property +				\$0	
TOTAL FEES ENCLOSED =				\$710	
				Amount to be refunded	\$
				charged	\$
<p>a. [ ] A check in the amount of \$ ____ to cover the above fees is enclosed.</p> <p>b. [ x ] Please charge my Deposit Account No. <u>16-2480</u> in the amount of \$ <u>710</u> to cover the above fees. A duplicate copy of this sheet is enclosed.</p> <p>c. [ x ] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>16-2480</u>. A duplicate copy of this sheet is enclosed.</p> <p>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.</p> <p>SEND ALL CORRESPONDENCE TO:</p>					
P. M. Ulrich, Patent Attorney Customer Number 27752				 Signature T. David Reed Name 32,931 Registration Number	

T01T60-4049E660

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Matter of:

U.S. National Phase Entry

Under 35 USC § 371 from

the International Application of

BECHMANN, Georg Rudolf Theobald et al.

Int'l Application No. PCT/US00/06984

Filed in the RO/US on 17 March 2000

Entitled:	An Article Comprising A Cell System
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PRELIMINARY AMENDMENT UNDER 37 CFR § 1.112

Assistant Commissioner for Patents

Washington, D.C. 20231

Dear Sir:

Prior to Examination and computation of the fees for entering the captioned International Application into the U.S. National Phase, please preliminarily amend the above-identified application as follows and consider the following Remarks.

AMENDMENTS

IN THE CLAIMS

Please amend Claims as follows:

3. A cell system (10) according to Claim 1, wherein the force required to burst one cell (1), when using said easy-opening means is comprised within the range of 10 to 80 N.
4. A cell system (10) according to Claim 3, wherein said easy-opening means (30) is achieved by providing at least one portion of the cell's walls with a laser scoring (31).
5. A cell system (10) according to Claim 3, wherein said easy-opening means (30) is achieved by providing the cell's walls with an elongated region (32) which features a burst force comprised within the range of 10 to 80 N.
6. A cell system (10) according to Claim 3, wherein said easy-opening means (30) is achieved by providing the cell with a weak seal.

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7. A cell system (10) according to Claim 3, wherein said easy opening means is further achieved by a cell in the shape of an O-ring made out of a non-burstable material, the cell further comprising strong peripheral seals (36) and a weak central seal (37), said weak central seal comprising a punctured hole in its middle part through which the cell's contents is directed once said weak central seal has been ruptured.
8. A cell system (10) according to Claim 3, wherein said easy-opening means (30) is achieved by providing the cells with at least one peelable portion (33), said portion being connected to a pull-string (38).
9. A cell system (10) according to Claim 3, wherein said easy-opening means is achieved by a pull-string (38) directly attached to at least one portion of the cell's walls.
10. A cell system (10) according to Claim 1, wherein said cell's material is a laminate made of polyolefin and metallic layers.
11. A cell system (10) according to Claim 1, wherein said at least one cell has an internal volume which is comprised within the range of 0.01 ml to 5.0 ml.
12. A cell system (10) according to Claim 1, wherein 50 to 99% of one cell's volume is filled with the composition.
13. An article comprising a cell system (10) as claimed in Claim 12.
16. An article according to Claim 15, which comprises a backing sheet, said article being folded in half and two halves being attached together by peripheral openable seals (20).
17. Use of an easy opening means as claimed in Claim 9, to facilitate the opening of the cells in a cell system (10) as described in the above claims.

**CLAIMS**

1. A cell system (10) comprising at least one burstable cell (1) filled with an active composition, the cell system (10) being characterized in that at least one cell (1) comprises an easy opening means (30).
2. A cell system (10) according to claim 1, wherein the material for making said at least one cell (1) has a water vapor transmission rate (WVTR) of less than 6g/sqm/day at 40°C/90%RH.
3. A cell system (10) according to <sup>CLAIM 1</sup> any of the preceding claims wherein the force required to burst one cell (1), when using said easy-opening means is comprised within the range of 10 to 80 N preferably 10 to 60N, more preferably 10 to 20N.
4. A cell system (10) according to <sup>CLAIM</sup> claims 1 to 3, wherein said easy-opening means (30) is achieved by providing at least one portion of the cell's walls with a laser scoring (31).
5. A cell system (10) according to <sup>CLAIM</sup> claims 1 to 3, wherein said easy-opening means (30) is achieved by providing the cell's walls with an elongated region (32) which features a burst force comprised within the range of 10 to 80 N, preferably 10 to 60N, more preferably 10 to 20N.
6. A cell system (10) according to <sup>CLAIM</sup> claims 1 to 3, wherein said easy-opening means (30) is achieved by providing the cell with a weak seal preferably a peelable seal.
7. A cell system (10) according to claim 1 to 3, wherein said easy opening means is further achieved by a cell in the shape of an O-ring made out of a non-burstable material, the cell further comprising strong peripheral seals (36) and a weak central seal (37), said weak central seal comprising a

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punctured hole in its middle part through which the cell's contents is directed once said weak central seal has been ruptured.

8. A cell system (10) according to <sup>CLAIM</sup> [claims 1 to 3], wherein said easy-opening means (30) is achieved by providing the cells with at least one peelable portion (33), said portion being connected to a pull-string (38).
9. A cell system (10) according to <sup>CLAIM</sup> [claims 1 to 3], wherein said easy-opening means is achieved by a pull-string (38) directly attached to at least one portion of the cell's walls.
10. A cell system (10) according to <sup>CLAIM 1</sup> [any of the preceding claims], wherein said cell's material is a laminate made of polyolefin and metallic layers, [preferably a LDPE/Alu/PET film laminate.]
11. A cell system (10) according to <sup>CLAIM 1</sup> [any of the preceding claims] wherein said at least one cell has an internal volume which is comprised within the range of 0.01 ml to 5.0 ml [preferably 0.4 to 2.0 ml.]
12. A cell system (10) according to <sup>CLAIM 1</sup> [any of the preceding claims] wherein 50 to 99% of one cell's volume is filled with the composition.
13. An article comprising a cell system (10) as claimed in <sup>CLAIM</sup> [any of the claims 1 to 12].
14. An article according to claim 13, wherein the cell system (10) is coupled to an dispersing article (12) for controlling the release and application of said active composition, once said at least one cell has been burst.
15. An article according to claim 14, wherein said dispersing article is a fibrous pad (12).

16. An article according to <sup>CLAIM</sup> [claims 14 and] 15, which comprises a backing sheet, said article being folded in half and two halves being attached together by peripheral openable seals (20).
17. Use of an easy opening means as claimed in <sup>CLAIM</sup> [any of the above subclaims 4 to] 9, to facilitate the opening of the cells in a cell system (10) as described in the above claims.

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## REMARKS

Claims 1, 2, 14, 15 remain in this application. Claims 3 through 13, and 16 and 17 have been amended by eliminating multiple dependent claims and deleting preferably phases. Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version With Markings to Show Changes Made".

The support for these amendments is found in the claims as originally filed. These amendments are being entered to bring the claims into conformance with, *inter alia*, 37 CFR §1.75; no new matter is added.

Respectfully submitted,

By



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FOR FEO-40492650



**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

In the claims:

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## Field of the invention

Table 1. Demographic characteristics of the study population	
Age (years)	65.0 ± 1.5
Gender	
Male	70
Female	70
Education (years)	12.0 ± 1.0
Marital status	
Married	70
Single	70
Divorced	70
Widowed	70
Income (USD/month)	1,200 ± 200
Health insurance	
Yes	70
No	70
Comorbidities	
Hypertension	40
Diabetes	30
Cholesterol	20
Smoking status	
Smoker	20
Non-smoker	50
Alcohol consumption	
Yes	10
No	60
Physical activity	
Active	30
Inactive	40
Medication use	
Yes	40
No	30
Quality of life (SF-36)	50.0 ± 10.0
Depression (PHQ-9)	10.0 ± 2.0
Stress (PSS-10)	20.0 ± 5.0
Social support (SSRS)	30.0 ± 10.0
Life satisfaction (VLE)	40.0 ± 10.0
Overall health (VLE)	50.0 ± 10.0
Healthcare utilization (times/year)	2.0 ± 1.0
Healthcare costs (USD/year)	1,000 ± 500
Healthcare satisfaction	
Yes	40
No	30
Healthcare access	
Yes	40
No	30
Healthcare quality	
Yes	40
No	30
Healthcare safety	
Yes	40
No	30
Healthcare effectiveness	
Yes	40
No	30
Healthcare equity	
Yes	40
No	30
Healthcare transparency	
Yes	40
No	30
Healthcare accountability	
Yes	40
No	30
Healthcare responsiveness	
Yes	40
No	30
Healthcare patient-centeredness	
Yes	40
No	30
Healthcare evidence-based practice	
Yes	40
No	30
Healthcare innovation	
Yes	40
No	30
Healthcare sustainability	
Yes	40
No	30
Healthcare resilience	
Yes	40
No	30
Healthcare adaptability	
Yes	40
No	30
Healthcare inclusiveness	
Yes	40
No	30
Healthcare accessibility	
Yes	40
No	30
Healthcare acceptability	
Yes	40
No	30
Healthcare appropriateness	
Yes	40
No	30
Healthcare timeliness	
Yes	40
No	30
Healthcare efficiency	
Yes	40
No	30
Healthcare effectiveness	
Yes	40
No	30
Healthcare equity	
Yes	40
No	30
Healthcare transparency	
Yes	40
No	30
Healthcare accountability	
Yes	40
No	30
Healthcare responsiveness	
Yes	40
No	30
Healthcare patient-centeredness	
Yes	40
No	30
Healthcare evidence-based practice	
Yes	40
No	30
Healthcare innovation	
Yes	40
No	30
Healthcare sustainability	
Yes	40
No	30
Healthcare resilience	
Yes	40
No	30
Healthcare adaptability	
Yes	40
No	30
Healthcare inclusiveness	
Yes	40
No	30
Healthcare accessibility	
Yes	40
No	30
Healthcare acceptability	
Yes	40
No	30
Healthcare appropriateness	
Yes	40
No	30
Healthcare timeliness	
Yes	40
No	30
Healthcare efficiency	
Yes	40
No	30
Healthcare effectiveness	
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Healthcare equity	
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No	30
Healthcare accountability	
Yes	40
No	30
Healthcare responsiveness	
Yes	40
No	30
Healthcare patient-centeredness	
Yes	40
No	30
Healthcare evidence-based practice	
Yes	40
No	30
Healthcare innovation	
Yes	40
No	30
Healthcare sustainability	
Yes	40
No	30
Healthcare resilience	
Yes	40
No	30

Disposable articles comprising at least one capsule filled with an active composition associated to a substrate, for example a cotton pad are representative of the various articles to which the present invention can apply; such disposable articles typically comprise at least one capsule filled with an active composition and at least one element made out of an dispersing material. At the time the user breaks the capsules, their contents spreads onto the dispersing material and the disposable article is ready to use.

The following references are directed to such articles comprising a capsule system associated to an absorbent substrate: *US 4.878.775* (D1) is a US patent to 3M. It discloses a device comprising burstable microcapsules containing a liquid, at least one sheet of a carrying substrate, and at least one sheet of a flexible liquid permeable material overlaying the microcapsules. Pressure on the device breaks the microcapsules and the liquid is dispensed on/through the liquid permeable sheet. *US 3.768.916* (D2) is a US patent to Medical Supply C<sup>y</sup>. It discloses a sponge comprising a hollow portion into which a glass ampoule is inserted. When the ampoule is broken by the user, the contained disinfectant soap impregnates the sponge for wound-cleaning use. *US 5.090.832* (D3) is a US patent to Colgate It discloses a disposable pad

comprising a scrubber layer, a blotter layer of absorptive material and a liquid impervious sheet located between the scrubber and the blotter layers. The pad further comprises at least one packet containing sufficient cleaning material to saturate the scrubber layer when ruptured. *FR 2.754.744* (D4) is a French patent application to A. Soares Duarte. It discloses a flexible film comprising cells filled with liquid. The cells are ruptured when pressure is exerted and the contained liquid is released and impregnates a support. *DE 3.545.926 A1* (D5) is a German application to A.G. Frühauf. It discloses a system in which the capsules are made out of a material which does not rupture, but in which the seals between the two constitutive layers of said capsules are delaminated under pressure. Then, the capsule's contents is free to flow between said layers up to punctured holes through which it is dispensed. *EP 0 294 189 A2* (D6) is a German patent application to Jaypak Ltd. It discloses a flexible bag combined to an absorbent applicator. The bag is burst to release the liquid inside the applicator.

While solving several issues, the above mentioned inventions still have some disadvantages. D1 discloses an article comprising microcapsules filled with a liquid composition. The size of the capsules is less than 3mm in diameter because of the material they are made of. This limits the range of uses because the volume of contained liquid is limited.

Some inventions, such as the one disclosed for example in D2, comprise a capsule filled with an active composition which is made out of glass. While such capsules can contain large amounts of active composition, they are made out of glass, or similar rigid materials, which become dangerous for the user once they are broken.

Documents D3 to D6 disclose articles wherein the capsules are not limited in volume, and are made out of a material which breaks without a risk of injury for the user - in most cases, the material is a substantially flexible film - However, for certain tasks the capsules need to be filled with an active composition which is sensitive to gases, vapors, or in some cases, light. While some documents refer to articles which comprise at least one liquid impervious

element, none of the cited art raises the problem of degradation of the capsule's contents by exchange of vapors/gases between the interior and the exterior of the capsules.

Furthermore, it appears that the film materials which are used for creating a barrier to liquids, solvents, vapors and gases, between the interior and the exterior of the cell, can render the cell difficult to rupture. Hence the need for a means which would facilitate the rupture of the cells by the user.

It is therefore one main object of the present invention to provide the user with an article comprising at least one cell filled with an active composition, the cell being made of a material which is such that the size of the cells is not limited to less than 3 mm in diameter.

It is another object of the present invention to provide the user with a cell system which can be used together with a substrate to be impregnated by the cell's contents, once said cell has been ruptured.

It is another object of the present invention to provide the user with an article wherein the cell presents no risk of injury to the user, once it was broken.

It is another object of this invention to provide the user with an article which prevents substantial exchanges of gases or vapors between the exterior of the article and the interior of the cell.

It is a further object of the present invention to provide the user with an article wherein the force for rupturing the cell is easily applicable by any user, while preventing accidental rupture during manufacture, transportation and storage.

### **Summary of the invention**

The present invention is directed to a cell system comprising at least one burstable cell filled with an active composition, the cell system being characterized in that each of said at least one cell comprises at least one easy opening means. Preferably, the cell system is associated with a dispersing element, such as for example a fibrous pad, or cotton pad. Preferably, the force

required to burst the cells is comprised within the range 10 to 80 N. More preferably, said at least one cell is made out of a material through which less than 10% product is lost per year at 35°C/20%RH, and more preferably, said material is a laminate comprising at least one layer of aluminium. In one most preferred embodiment, the cells are provided with an easy opening means.

### **Brief description of the drawings**

The invention will now be explained in detail with reference to the accompanying drawings, in which:

- Figure 1 is a perspective view of an article according to the present invention, comprising a cell system and a flat dispersing support.

- Figure 2 is a perspective view of an article comprising a cell system and a dispersing support folded in half, the article being shown in partially opened position.

- Figure 3 is a profile cut view showing one cell, with screen window to control the direction and flow of the cell's contents, once the cell has been burst.

- Figure 4 is a profile cut view of an article according to one embodiment of the present invention, the article comprising a cell system, a flow-control means, and a dispersing support, the cell being centered relatively to the window of the flow-control means.

- Figure 5a is a profile cut view of an article according to one embodiment of the present invention, the article comprising a cell system, a flow-control means, and a dispersing support, the cell being off-centered relatively to the window of the flow-control means.

- Figure 5b is similar to 5a, but the article is shown in folded configuration, as it is packed prior to its use.

- Figure 6a is a schematic profile view showing a cell with easy opening means, said easy opening means being a laser scoring.

- Figure 6b is a schematic profile view showing a cell with easy opening means, said easy opening means being an elongated, thinner, portion of the cell's dome.

- Figure 6c is a schematic profile view showing a cell with easy opening means, said easy opening means being a weak seal located between the dome and the bottom of the cell.

- Figure 7a is a schematic perspective view showing an O-ring cell with central weak seal for providing an easy opening means.

- Figure 7b is a schematic profile cut view showing an O-ring cell with central weak seal for providing an easy opening means.

- Figure 8a is a schematic profile cut view of an article according to one embodiment of the invention, the article being shown in closed position, and comprising a cell system, an easy opening means, and a dispersing pad, said easy opening means being achieved by the combination of a weak peelable seal with a pull string.

- Figure 8b is similar to the previous Figure 8a, the article being shown in opened configuration with cell's contents released into dispersing support, after the user has pulled on the pull-string to rupture the weak seal.

- Figures 9a to 9c are schematic profile cut views of one cell with easy opening means, said means being a pull-string.

- Figure 10a is a schematic profile cut view of one cell according to the invention, with a pull-string attached to the periphery of the cell's dome, as an easy opening means.

- Figure 10b is a schematic profile cut view of one cell, showing a pull-string attached to the bottom part of the cell, to be used as an easy opening means.

- Figure 10c is a schematic profile cut view of one cell, showing a pull-string attached to the top portion of the cell's dome.

- Figure 11 is a profile schematic view showing one cell of the cell system formed as a sachet.

- Figure 12 is a profile schematic view showing one cell of the cell system with integral flow-control means.

### **Detailed description of the invention**

The article of the present invention has one or multiple enclosures or closed cells which contain fluid or solid (including powdered) products, preferably liquid products, which are released from the individually sealed enclosures via the increase of internal pressure within the enclosure eventually leading to rupture of one of the enclosing materials or a seal that may be present between two pieces of enclosing material. As an alternative to compression, a gas-producing reaction can be initiated to increase the cell's internal pressure to the point of rupture.

The invention is more generally related to a single or multiple cell system connected by some means to create an article or substrate of a system of chamber(s) or cell(s). The cells are ruptured by one means or another thus opening the chambers to exposure to: (i) the outside environment; (ii) an internal constrained (but larger volume) environment within the system or article; or, (iii) other fluids (e.g. gases) outside of the original chambers which may enter into the previously sealed chambers. The purpose of such exposure is to provide a useful benefit to the user including but not limited to: dispensing fluids or solids (including powders) in the cells to contact and optionally disperse onto a target surface for a variety of purposes ; mixing different materials from different cells to cause a useful chemical reaction as described above ; exposing a reactive material to a fluid (e.g. gaseous air or liquid water) found in the environment to cause a useful chemical reaction where either the chemical composition or even the phase state of the end products of the reaction or the energy/heat flow of the reaction may be the useful endpoint sought ; exposing a fluid or solid to the gaseous environment for the purpose of volatilizing and distributing components of said fluids or solids.

The above-mentioned applications for the present invention can be directed to a multitude of user-beneficial outcomes including, but not limited to: cleaning, bleaching, cooling, heating, deodorizing, disinfecting, medicating, wiping...

The article of this invention optionally but preferably features a support dispersing material designed to absorb the product upon release. This support material is designed to assist the user in the application of the product.

For the article, barrier properties are required to prevent significant product(s) loss through permeation (i.e. less than 10 % product loss/year at 35°C/20% RH and the product(s) must keep the activity it is designed for). The barrier properties of the closed cell(s) level are provided by a high barrier material. Furthermore, it has been found that most of such barrier materials are difficult to rupture, and thus an easy opening means is preferably added to the cells.

### **The cells**

As shown in figures 1 to 10, the article (1) is provided with a cell system (10) which comprises at least one cell (11) filled with an active composition, which can be either solid, particles, granulates, powder, liquid, or even a gas, but is preferably a liquid composition. Depending on the purposes, the cell system (10) can comprise two or more cells, filled with the same, or different compositions (see example of contained compositions below). The cell system (10) can be used by itself, or it can also be coupled to a solid medium, for example a dispersing support (12) or an absorbent support. It can also be integrated into a pouch filled with liquid or gas.

In one embodiment, a cell (11) comprises a bottom (13) and a dome (14). The dome (14) can be made out of a flat film which is deformed into the cavities of a mold, for example by a thermoforming process. Once filled with the active composition, the dome (14) is closed by sealing the bottom (13) which preferably is a flat film. The cells (11) are ruptured by applying a constraint onto their surface which can be mechanical such as a pressure, a tearing or peeling movement; or a chemical reaction which dissolves the surface of the cell. In one embodiment, the cells (11) are burst when the user applies a compression force on the top or the sides of the cell, as shown for example in figure 6c. This leads



to rupture one portion of the dome (14) of the cell (11). The cell (11) normally ruptures in its dome portion (14). This is due either to the fact that the material used to make the cell bottom is chosen as more resistant to rupture than the material for the dome (14), or in case the same materials are used for forming the bottom (13) and the dome (14), this is due to the manufacturing process: since the dome (14) is thermoformed in this example, its constitutive material thins down in at least one point, where mechanical properties, and especially resistance to burst, are decreased. In another embodiment, the cells (14) are chemically dissolved. In another embodiment, rupture of the cell is achieved by an easy opening means, as will be further described hereafter.

The cells (11) can have any shapes or dimensions, such as for example parallelepipedic, oval or hemispheric, but while not being limited, their volume is preferably comprised within the range of 0.01 to 5.0 ml, more preferably within the range of 0.4 to 2.0 ml. For example in the case the cells are substantially hemispheric, their diameter is preferably comprised within the range of 10 to 20 mm and their depth is between 6 and 15 mm. Preferably, 50 to 99% of one cell's volume is filled with liquid. In the case of cells filled with a liquid active composition, the cell (11) is preferably made out of a liquid impervious material.

While the cell bottom and top can be joined or sealed by a variety of known techniques including adhesives, the cell's material should preferably feature good sealing properties and mechanical properties such that the user can rupture the cells to get the contained active composition out by applying a reasonable force, while the cells need to be strong enough not to rupture prematurely, for example during manufacturing, storage or transportation. Furthermore, the material shall be chosen such that it does not produce sharp particles once broken, especially glass shall not be used since it produces glass splinters which can be very dangerous for example when the article (1) is used for facial/body cleaning purposes.

In another embodiment, the cells (11) have the shape of sachets, as shown for example in figure 11. Such sachets (11) are made out of a film which is folded and sealed. The film is a high barrier film as described hereafter.

Preferably, the sachet also comprises an easy opening means, more preferably it comprises at least one peelable seal (23) which ruptures when the user applies sufficient pressure on the sachet (11).

Typically, the force to be applied by the user to rupture one cell or sachet, is substantially comprised within the range of 10 to 80 N (force applied on top of the cell). Preferably, the force to be applied to burst the cells (11) is less than 60 N, more preferably less than 40 N. Most preferably it is comprised within the range of 10 to 20 N. It has been found that this force to burst usually decreases for a same cell when the force is applied on the sides for substantially hemispheric shaped cells.

The material for making the cells is defined as a barrier material. Such a material is defined as having a permeation of less than 10% product loss/year at 35°C/20%RH, so that the active composition keeps the activity it has been designed for. Typically, such properties are achieved by using a film which is: liquid impervious in that no liquid passes through it after 30 sec.; a barrier to vapors/solvents in that its water vapor transmission rate (WVTR) is less than 6g/sqm/day at 40°C/90%RH; and optionally a barrier to gases in that its O<sub>2</sub>TR (oxygen transmission rate) is less than 200cc/sqm/day/atm at 23°C/50%RH.

The barrier film can have one thick layer of a thermoplastic, but is preferably a laminate material comprising at least one layer of a barrier material such as an aluminium laminate for example, which is sandwiched between thermoplastic outer layers, for good sealing properties of the film. In a most preferred embodiment, the film is laminated comprising at least one aluminium layer which gives very good barrier properties to liquids, gas and vapors, for example a LDPE/Alu/PET having a thickness of respectively 80µm/9µm/12µm. Other options can be to use thick thermoplastics, such as high density polyethylene (HDPE) more than 50µm thick, or polypropylene (PP) more than 100µm thick, or low density polyethylene (LDPE) more than 150µm thick. Despite such materials are not specifically high barrier materials, the thickness which is used is such that it allows good barrier properties of the cells. Most preferably in this case, the cell made out of a laminate material has the shape of

a sachet, as shown in figures 11 and 12. Such a sachet is preferably manufactured with a vertical (VFFS) or a horizontal (HFFS) form fill & seal process. Such forming processes are well known in the art of making sachets and pouches. Typically, a film is folded in halves and sealed on its periphery to close the pouch. Optionally, a weak seal can be formed in the middle part of the sachet, as shown in figure 12, such as to create compartments, which can be connected when the seal is broken (for example upon application of a pressure on one of the compartments).

The thickness of the material used for making the cells should be adapted to the nature of the material which is used, so that said thickness is as little as possible while keeping barrier properties as defined above. It is preferably comprised within the range of 35 to 90  $\mu\text{m}$ , more preferably within the range of 35 to 50  $\mu\text{m}$ . When the thickness is below 35  $\mu\text{m}$ , it was found that manufacturing problems appear, for example wrinkles appear during thermoforming, and the force to rupture the cells is decreased - typically below 10 N - which leads to premature burst. Thicknesses above 90  $\mu\text{m}$  may be used, such values will however lead to cells which are particularly resistant to rupture.

It has been found that when cells are constructed with materials having barrier properties as defined above, the force to burst is often more than the acceptable value (i.e. 10 to 80 N). This is due firstly to the thickness of the film which is limited to a minimal value, under which the barrier properties are not achieved, and/or secondly to the nature of the polymer.

Optionally but preferably, each cell of the cell system according to the present invention is provided with an easy opening means. Several possible embodiments of easy opening means can be applied to the present invention, which are discussed hereafter.

#### **The easy-opening means**

Optionally but most preferably, each cell of the cell system according to the present invention is provided with an easy opening means (30), such as to counter balance the high force required to burst the cell (11).

In one first embodiment and as shown in figure 6a, said easy opening means (30) is achieved by applying a laser scoring (31) onto the surface of the cell. Preferably, said laser scoring (31) is located on the cell's dome (14), more preferably on the top portion of said cell's dome. Techniques for making such laser scorings are well known in the art. The shape and dimensions of the laser scoring may be determined by those skilled in the art, such as to create a cell which can be burst when applying a force comprised within the range of 10 to 80 N, preferably, 10 to 60 N, more preferably 10 to 40 N, and most preferably within the range of 10 to 20 N. The advantage of such an easy opening means (30) is that it decreases the force to burst the cell, by creating an area in its walls where the thickness is decreased. However, the barrier properties are only marginally affected by the lower thickness, since the surface of the laser scoring is very limited.

In a second embodiment of the present invention, the easy opening means (30) is achieved by providing the cell with at least one elongated portion (32), as shown in figure 6b. Such an elongated region (32) has a lower thickness compared to the rest of the cell's walls, due to the manufacturing process, usually a thermoforming process or similar, which is such that the elongated portion (32) will be more stretched during manufacture of the cell, and thus, will have a lower thickness. The optimum thickness for the elongated portion may be determined via a sampling/trials procedure, and will typically depend on the nature of the material, nature of the contents, temperature of use, so as to achieve barrier properties as defined above. In any case, the volume inside said elongated portion should preferably be less than 10 % of the cell's total volume, more preferably less than 5% of the cell's total volume, and most preferably less than 2 % of the cell's total volume. In this way, the exchanges of gases, vapors, and solvents, as well as the risk of leaking (in case the cell's contents is a liquid) are limited over the period from the manufacture to the use. Alternatively but similarly, the easy opening means (30) is an inverted elongated portion of the

cell, with less thickness, so that it is pointing in the inside of the cell. At the time the user presses onto the cell, the inverted protrusion comes inside out and bursts to release the cells contents.

In a third embodiment of the present invention, the easy opening means (30) is achieved by a peeling area (33) located at the interface between the dome of the cell (14) and its bottom part (13), as shown in figure 6c. When the user presses on the top of the cell, an internal pressure is created inside the cell, which peels the seal off. Techniques of making seals between two films are well known in the art, and a skilled person will easily find the correct parameters when making the seal, so that the force to peel off the seal is preferably comprised within the range of 10 to 80 N, as previously described. Such techniques include heat sealing, hot gluing, cold gluing which are well known techniques in the field of making seals. Alternatively, when the cell has the shape of a sachet made by a VFFS or HFFS forming process, the peeling area can be a weak seal (23), as shown in figure 12 for example. In one embodiment, the weak seal (23) is located on a side of the sachet. In another embodiment, the sachet (11) comprises at least two compartments separated by a weak seal (23), the first compartment being closed and filled with a composition, and the other compartment being punched with a cut-out portion (16). When the user presses on the first closed compartment, the median weak seal (23) breaks and the composition passes to the second compartment, and is dispensed through the cut-out portion which acts as a means for controlling the direction and flow of released composition.

In a forth embodiment of this invention, the easy opening means (30) is achieved by an O-ring shaped cell, as shown in figures 7a and 7b. The cell's contents is located inside circular peripheral walls (34). The cell further comprises a central channel (35). The outer seal (36) is strong while the inner seal (37) is weak and comprises a central punctured hole through which the contents is free to pass when said weak seal is broken. When pressure is applied onto the cell, the central weak seal breaks, and the cell's contents is released to the outside through the central channel (35) of the cell. This further allows to control the direction of the released contents.

In a fifth embodiment of the present invention, the easy opening means (30) is achieved by a pull string (38) which is attached to at least one portion of the cell. The pull string comprises an attachment portion, which is fixed to the cell, and a free portion which is long enough to be reached and pulled by the user. Usually, cells are ruptured by pressing onto them, in this case the user's force is dispersed over the surface of contact comprised between the fingers and the cell. When the cell's material is difficult to rupture, the force needs to be more concentrated to one point of the cell, to be more effective in rupturing said cell. Such a concentration is achieved by using the pull string having a small diameter (preferably less than 1mm), which is fixed to a limited surface of the cell. For example, it can be attached all around the periphery of the cell, as shown in figures 9a and 9b. It can also be attached around a portion linking two cells, as shown in figure 9c. It can also be attached to certain points of the periphery of the cell, at the seal region between the dome and the bottom of said cell, as shown in figure 10a. The pull string can be attached directly to the bottom of the cell, thus passing through the cell, as shown in figure 10b. It can also be attached to the top part of the cell's dome, as shown in figure 10c.

In a sixth embodiment of the present invention, the easy opening means (30) is providing each cell of the cell system with at least one peelable seal (33), said at least one peelable seal further comprising a pull string (38), as shown in figures 8a and 8b. The user releases the cell's contents by pulling on the pull-string, thus peeling off the weak seal. Preferably, said peelable weak seal is a portion located at the interface between the dome (14) and the bottom (13) of the cell.

The two preceding embodiments are also applicable in the case the cell has the shape of a sachet made by a VFFS or a HFFS forming process.

### **The support material**

Preferably, the cell system (10) is coupled to a support material (12). In a first embodiment of this invention, said support material is made out of a liquid impervious material, such as for example a flexible pouch which contains the cell

system. In another embodiment of this invention, the support material is an dispersing material (12), such as for example, a fibrous pad for facial cleaning for example made out of cotton, a wipe for body or household cleaning made out of a non-woven material, a pad to be used for wound-protection, as shown for example in figures 1, 2 or 4. Said dispersing material (12) can have any shape, and dimensions suitable for containing or being coupled with a cell system (10) with dimensions as defined above. Once the active composition contained inside the cell (11) has been released, said composition disperses into the structure of the dispersing material, up to its surface. The structure of said dispersing material can be chosen so as to fit the purposes of the article (1): it can have a smooth surface for pampering, or a rough surface for cleaning, rubbing or removing dead skin for example, or it can be spongy for moisturizing/impregnating the surface to treat. The thickness, shape and dimensions of the dispersing material should be chosen relatively to the number of cells (11) comprised inside the cell system (10), and the volume of active composition contained inside each cell (11). Examples of fibrous pads are already known in the art, and some of them are particularly described in US.5.738.212.

#### **The flow control means**

It has been found that in some occasions, and particularly when the active composition contained inside the cells (11) comprises a liquid or cream form, spillage of said composition can occur at the time the cell (11) is ruptured, even when the cell system (10) is coupled to or associated with an dispersing material (12). To prevent spillage and/or ensure good absorption and diffusion of the composition at the surface of the dispersing material (12), if any, the article (1) of the present invention is optionally but preferably provided with a means to control the flow of released active composition when the cell (11) bursts.

As shown in figures 3 to 5, the flow-control means (15) is a film which covers at least the dome (14) side of the cell (11) and comprises at least one restricted area for the active composition to pass through, from the cell (11) to

the outside medium. Optionally, said film also covers the bottom (13) of the cell (11), so as to prevent any spillage of the composition from the bottom (13) side of the cell (11) in case of accidental or intentional burst of said bottom (13) of the cell (11). In one embodiment, the flow-control means (15) is provided with a cut-out portion (16), through which the active composition released from the cell (11) is directed. In another embodiment, the flow-control means (15) is achieved by a cut-out portion of the film onto which a flow-control window (17) such as for example a grid, or a sheet of a porous material is adapted, as shown in figures 6 and 7. Such a grid material is described for example in US.3.929.135 to Thompson, or in US.4.324.246 to Mullane, or in US.4.342.314 to Radel. Another grid material which can be used is known under the trademark name "DRI-WEAVE™" marketed by The Procter & Gamble Company. The surface of the portion through which the product will be dispensed may be adapted, for example in view of the viscosity of the product, and also in view of the application of this product. Typically, the surface is comprised within the range of 1 to 1500 mm<sup>2</sup>, preferably 25 to 700 mm<sup>2</sup>.

Preferably in both of the preceding embodiments, and as shown in figure 7, the cut-out portion (16) or the flow-control window (17) is not aligned with a cell (11), so that the way of released composition from the cell to the exterior - for example, to the absorbent cotton pad (12) - is diverted. This allows to better prevent spillage of composition to the exterior, especially in case said composition has a very low viscosity (i.e. less than 100 cps measured with a viscosity meter at 20°C, 1200 rpm).

Alternatively, when the cell has the shape of sachet (11) made of a film which is folded in halves, with sealings on the sides, the flow control means (15) can be an extension (24) of the sachet which comprises for example a punched portion (16), as shown in figure 12. The main sachet-cell (11) which is filled with a product, and its flow-control extension (24) are separated by a peelable seal (23). Both are manufactured from the same film which is folded in two halves and sealed, with one median seal (23), so that when the user applies a pressure on the top of the filled portion of the sachet (11), it breaks the peelable seal (23),



creating a channel between the sachet (11) and the flow-control extension (24), and the product is released through the punched portion (16).

### Examples

Different possible embodiments of articles according to the present invention will now be described in detail, with reference to the accompanying figures.

In a first embodiment of the present invention, one article (1) comprises a cell system (10) with one cell filled with an active composition. The cell is made out of a material which is a barrier to liquids, gases, vapors and solvents, as defined previously. The cell is preferably covered by a flow control means, such as a film with a cut-out portion (16) which is off-centered relatively to the dome (14) of the cell. The flow-control film is attached onto the cell system (10) by sealing or gluing its edges to the cell system's edges. Said cell system (10) is further sandwiched between two layers of an dispersing material (12) such as cotton, so as to create an absorbent cotton pad with an integrated burstable cell where the two outer layers of cotton can be glued or taped one to the other, but are preferably sealed, using the thermoplastic material of the cell system (10) and/or the thermoplastic material of the flow-control means (15) as sealing agent(s). The cotton pad further comprises an integrated outer package. Said outer package (19) is integrated to the article (1) as a backing sheet which is glued or sealed to the outer side of the pad opposite to the dome (14) of the cell, as shown in figure 5a. Preferably, the surface of the backing sheet is slightly superior to the surface of the cotton pad, so that when the pad is folded into two halves into a clamshell-like article, both halves being maintained in closed position by a peelable peripheral seal (21), the backing sheet protects the whole cotton pad inside from the outside medium. The clamshell article (1) is used by peeling or cutting the outer package open, bursting the cell to release the active composition into the cotton pad, and then using it. Preferably also, the cell is off-centered from the pad's folding, so as to reduce the risk of accidental squeeze in the pad's folding, and burst of the cell during transportation or storage. The

clam-shell structure with integrated outer package as a backing sheet enables the consumer to use a pad whose surface which comes in contact with the surface to treat has never been in contact with another surface (i.e. fingers of the user or neck of a bottle), and thus is very clean, even once the active composition impregnates the pad. This renders this structure particularly useful for cosmetic purposes.

The present embodiment is best achieved by providing the cell with an easy opening means. Said means can be of any type but more preferably of one of the types previously described. For example, it is a laser scoring which is located onto each cell's dome.

In a second embodiment of this invention, and as shown in figure 2, each article (1) comprises a cell system (10) with one cell (11) filled with the active composition. It further comprises an absorbent pad (12), for example a cotton pad which contains the cell system (10). The pad is folded into two halves which are maintained by sealing portions (20), which are glued, peel-sealed, taped, or maintained by another suitable means for securing the pad in folded position while being easily openable during use. The barrier to liquids, gases or vapors is achieved the material for making the cell's walls which is for example a laminate LDPE/Alu/PET having a thickness of respectively 80µm/9µm/12µm. One or more articles shall be contained in a separate outer package, such as for example a pouch, or a film wrapping.

The present embodiment is best achieved by providing the cell with an easy opening means. Said means can be of any type but more preferably of one of the types previously described. For example, it is a laser scoring which is located onto each cell's dome.

In a third embodiment of this invention, and as shown in figure 1, each article (1) comprises a cell system (10) with several cells (11) filled with the active composition. It further comprises a flat absorbent pad (12), for example a flat cotton pad which contains the cell system (10). The barrier to liquids, gases or vapors is achieved by the material for making the cell's walls, which is for

example a laminate LDPE/Alu/PET having a thickness of respectively 80µm/9µm/12µm. One or more articles shall be contained in a separate outer package, such as for example a pouch, or a film wrapping.

The present embodiment is best achieved by providing the cells with easy opening means. Said means can be of any type but more preferably of one of the types previously described. For example, it is a laser scoring which is located onto each cell's dome.

### **Contents**

The active composition which is contained inside the cell can be of any type, for example a face cleaning lotion or cream, a disinfectant composition, a composition for household cleaning purposes, a perfume composition, a polish, a medicament... Its viscosity is preferably comprised within the range of 0.1 to 6000cps measured at 20°C. In one embodiment of the present invention, the active composition is a liquid face cleaning and disinfecting composition known under the trademark Clearasil™ manufactured and sold by The Procter & Gamble Company. Such a composition typically comprises for example: Purified Water; Alcohol 96%; Diethyl Phthalate; Myrtrimonium Bromide; Ceteareth-14; Disodium Cocoamphodiacetate 38%; Tartaric Acid; Allantoin; Chlorhexidine Digluconate 20%; Perfume Balance PSV 1270; CI 42051 Acid Blue 3 E131. Detailed examples of such composition are disclosed for example in European Patent Applications EP-A-0614353 and EP-A-0614354 to the Procter & Gamble Company.

**CLAIMS**

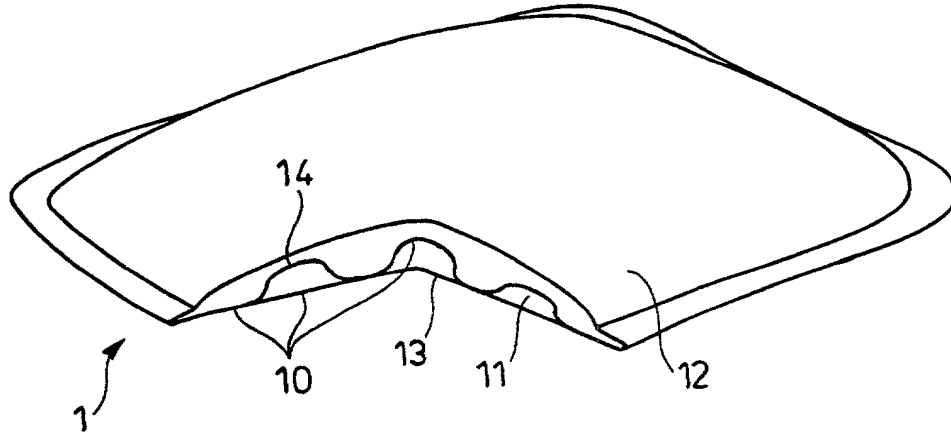
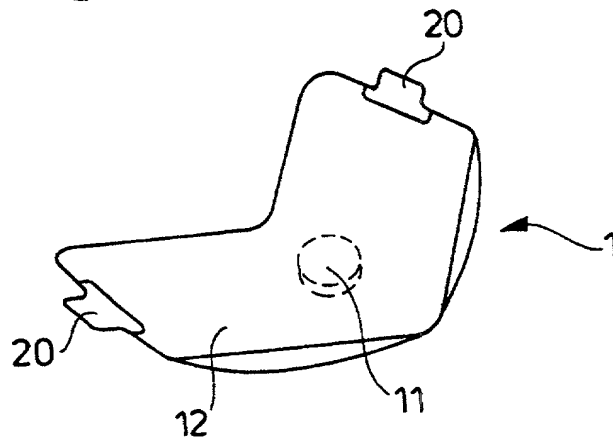
1. A cell system (10) comprising at least one burstable cell (1) filled with an active composition, the cell system (10) being characterized in that at least one cell (1) comprises an easy opening means (30).
2. A cell system (10) according to claim 1, wherein the material for making said at least one cell (1) has a water vapor transmission rate (WVTR) of less than 6g/sqm/day at 40°C/90%RH.
3. A cell system (10) according to any of the preceding claims, wherein the force required to burst one cell (1), when using said easy-opening means is comprised within the range of 10 to 80 N, preferably 10 to 60N, more preferably 10 to 20N.
4. A cell system (10) according to claims 1 to 3, wherein said easy-opening means (30) is achieved by providing at least one portion of the cell's walls with a laser scoring (31).
5. A cell system (10) according to claims 1 to 3, wherein said easy-opening means (30) is achieved by providing the cell's walls with an elongated region (32) which features a burst force comprised within the range of 10 to 80 N, preferably 10 to 60N, more preferably 10 to 20N.
6. A cell system (10) according to claims 1 to 3, wherein said easy-opening means (30) is achieved by providing the cell with a weak seal, preferably a peelable seal.
7. A cell system (10) according to claim 1 to 3, wherein said easy opening means is further achieved by a cell in the shape of an O-ring made out of a non-burstable material, the cell further comprising strong peripheral seals (36) and a weak central seal (37), said weak central seal comprising a

punctured hole in its middle part through which the cell's contents is directed once said weak central seal has been ruptured.

8. A cell system (10) according to claims 1 to 3, wherein said easy-opening means (30) is achieved by providing the cells with at least one peelable portion (33), said portion being connected to a pull-string (38).
9. A cell system (10) according to claims 1 to 3, wherein said easy-opening means is achieved by a pull-string (38) directly attached to at least one portion of the cell's walls.
10. A cell system (10) according to any of the preceding claims, wherein said cell's material is a laminate made of polyolefin and metallic layers, preferably a LDPE/Alu/PET film laminate.
11. A cell system (10) according to any of the preceding claims, wherein said at least one cell has an internal volume which is comprised within the range of 0.01 ml to 5.0 ml, preferably 0.4 to 2.0 ml.
12. A cell system (10) according to any of the preceding claims, wherein 50 to 99% of one cell's volume is filled with the composition.
13. An article comprising a cell system (10) as claimed in any of the claims 1 to 12.
14. An article according to claim 13, wherein the cell system (10) is coupled to an dispersing article (12) for controlling the release and application of said active composition, once said at least one cell has been burst.
15. An article according to claim 14, wherein said dispersing article is a fibrous pad (12).

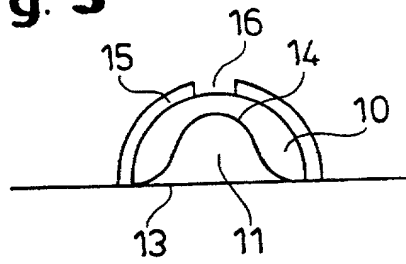
16. An article according to claims 14 and 15, which comprises a backing sheet, said article being folded in half and two halves being attached together by peripheral openable seals (20).
17. Use of an easy opening means as claimed in any of the above subclaims 4 to 9, to facilitate the opening of the cells in a cell system (10) as described in the above claims.

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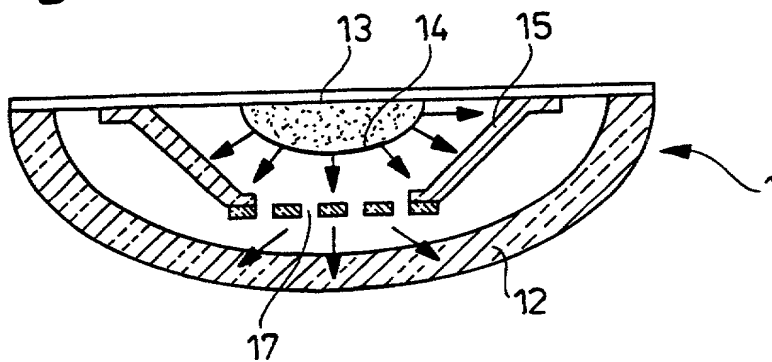
**Fig. 1****Fig. 2**

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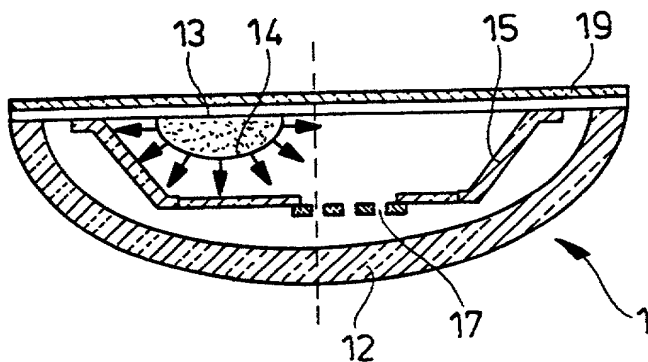
**Fig. 3**



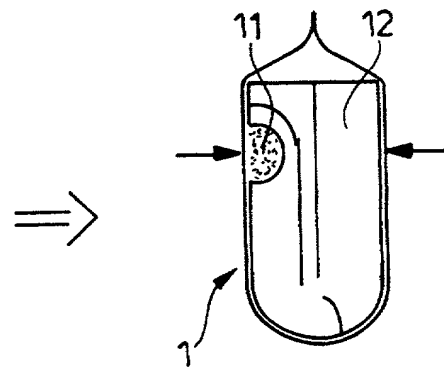
**Fig. 4**



**Fig. 5a**

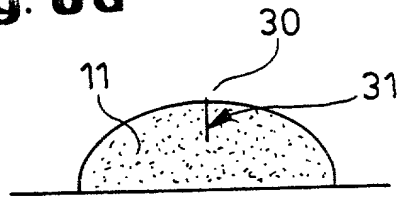
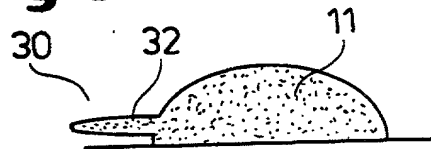
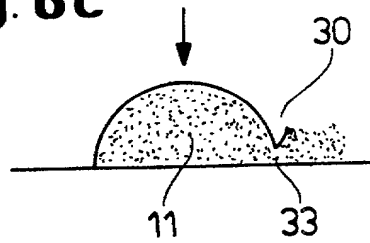
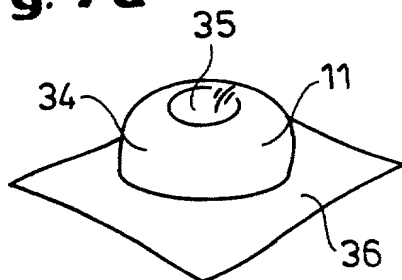
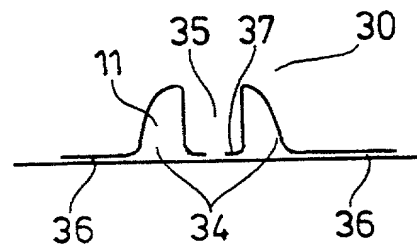


**Fig. 5b**

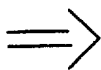
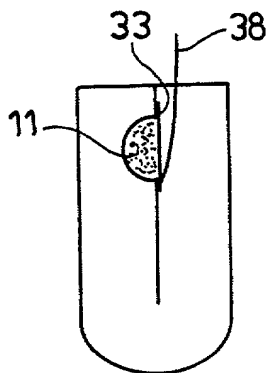




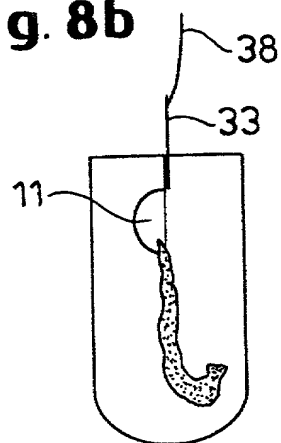
- 3 / 6 -

**Fig. 6a****Fig. 6b****Fig. 6c****Fig. 7a****Fig. 7b**

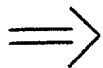
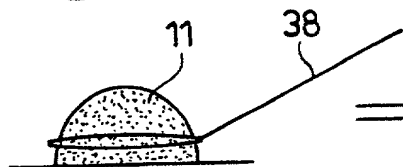
**Fig. 8a**



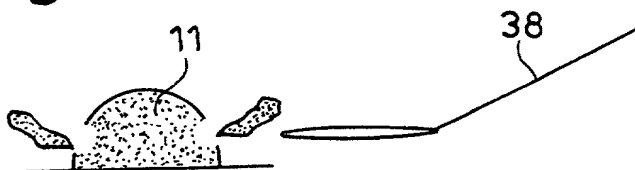
**Fig. 8b**



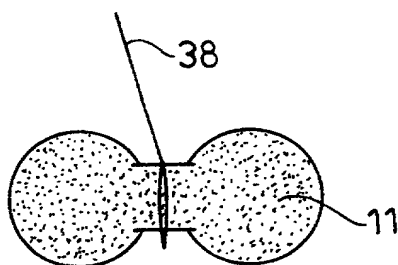
**Fig. 9a**



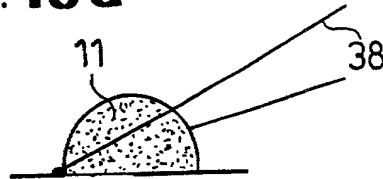
**Fig. 9b**



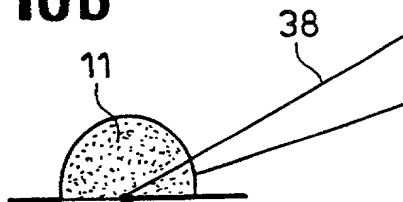
**Fig. 9c**



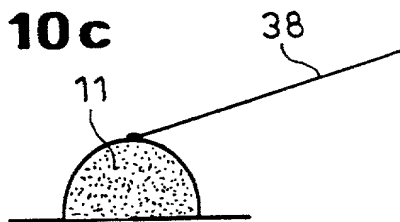
**Fig. 10a**



**Fig. 10b**

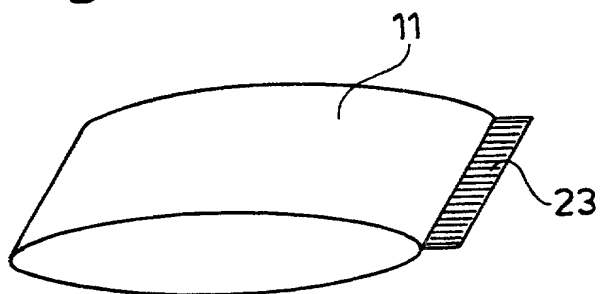
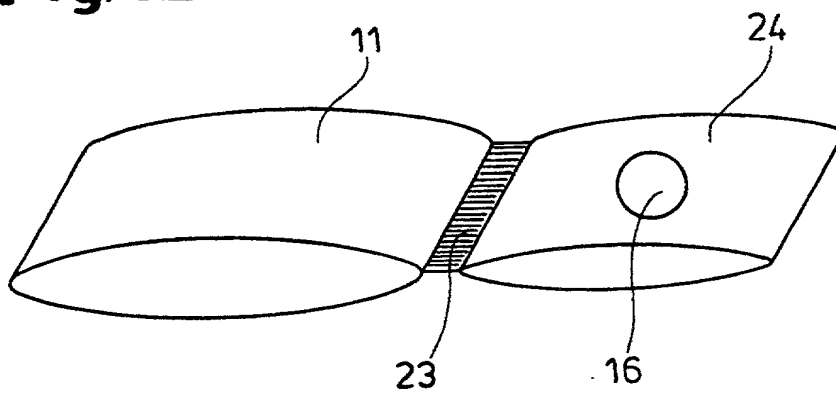


**Fig. 10c**



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**Fig. 11****Fig. 12**

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the U.S. National Phase Entry  
Under 35 USC 371 from  
International Application of  
BECHMANN, Georg Rudolf Theobald et al.  
Int'l Application No. PCT/US00/06984  
Filed in the RO/US on 17 March 2000

Entitled:	An Article Comprising A Cell System
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ASSOCIATE POWER OF ATTORNEY

Assistant Commissioner for Patents  
Box PCT  
Washington, D.C. 20231

Dear Sir:

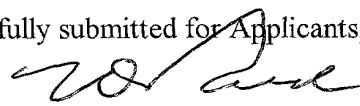
You are requested to recognize L. W. Lewis (Registration No. 30,769), P. D. Meyer (Registration No. ~~P-47,792~~), L. L. Huston (Registration No. ~~32,994~~), A. M. Stone (Registration No. 41,335), and P. M. Ulrich (Registration No. 46,404) of The Procter & Gamble Company, Cincinnati, Ohio, as Associate Attorneys to prosecute this application, to make alterations and amendments therein, and to transact all business in the Patent Office connected with the application or with the patent granted thereupon.

Please address all future communications to:

P. M. Ulrich, Patent Attorney  
Customer No. 27752

Respectfully submitted for Applicants,

By

  
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poaitc

Appln. Serial No.	Filing Date	Status - patented, pending, abandoned
Appln. Serial No.	Filing Date	Status - patented, pending, abandoned

I hereby appoint the following as my attorney(s) or agent(s) with full power of substitution to prosecute this application and transact all business in the Patent and Trademark office connected therewith:

Name	Registration No.	Associate Power of Attorney Attached [ ] Yes [ ] No
Jacobus C. Rasser	<u>37,043</u>	
Donald E. Hasse	<u>29,387</u>	
T. David Reed	<u>32,931</u>	
Eileen L. Hughett	<u>34,352</u>	
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willfull false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such will ful false statements may jeopardize the validity of the application or any patent issued thereon.

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Inventor's signature \_\_\_\_\_ Date: \_\_\_\_\_

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